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Earth System Services communication: bringing science to society

Marta Terrado, Dragana Bojovic, Albert Soret, Francisco Doblas-Reyes

Earth System Services Group, Earth Sciences Department

EMS Annual Meeting 2017, Dublin

Aim of the Earth Sciences department

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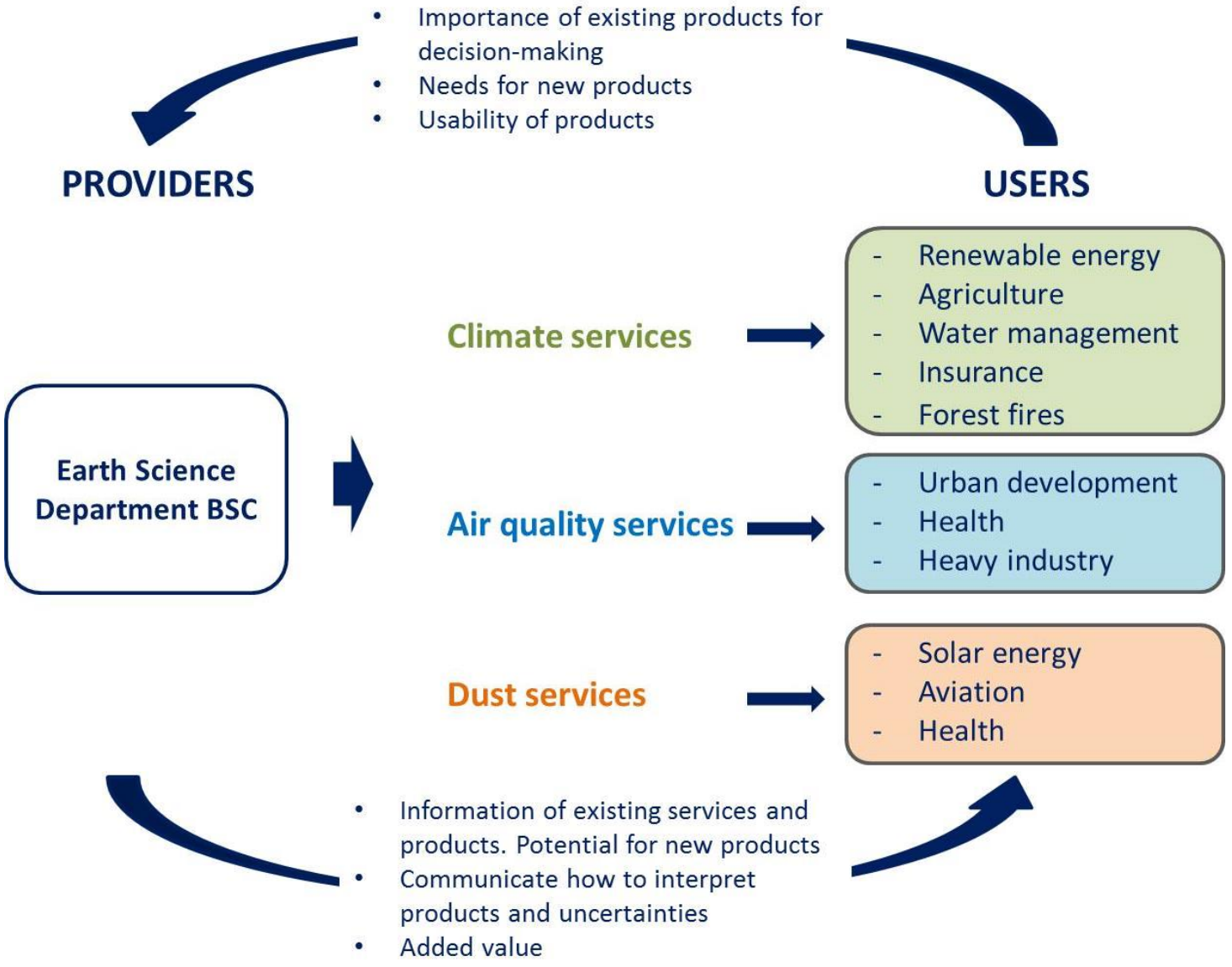
Demonstrate the ongoing value of climate services and air quality services to the citizens and the economy through:

- The application of HPC to **transfer knowledge and technology** to support adaptation to a rapidly changing environment
- **Provision of services** based on **user-defined sectoral needs** that help anticipate the adverse effects of climate change and air quality deterioration

Communication in both directions

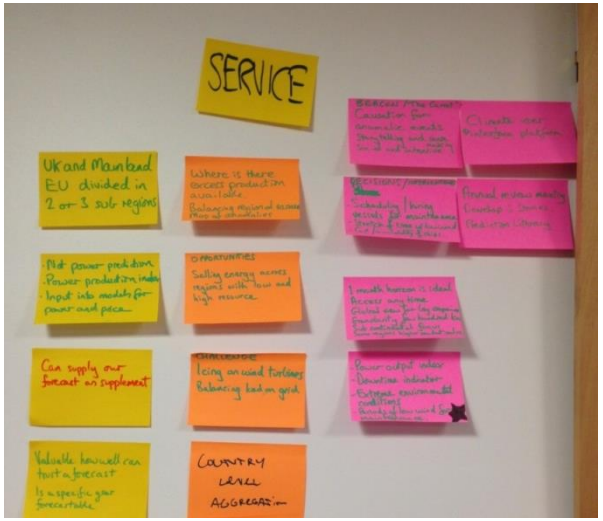


From users to providers

- Importance of existing products for decision-making
- Needs for new products
- Usability of products

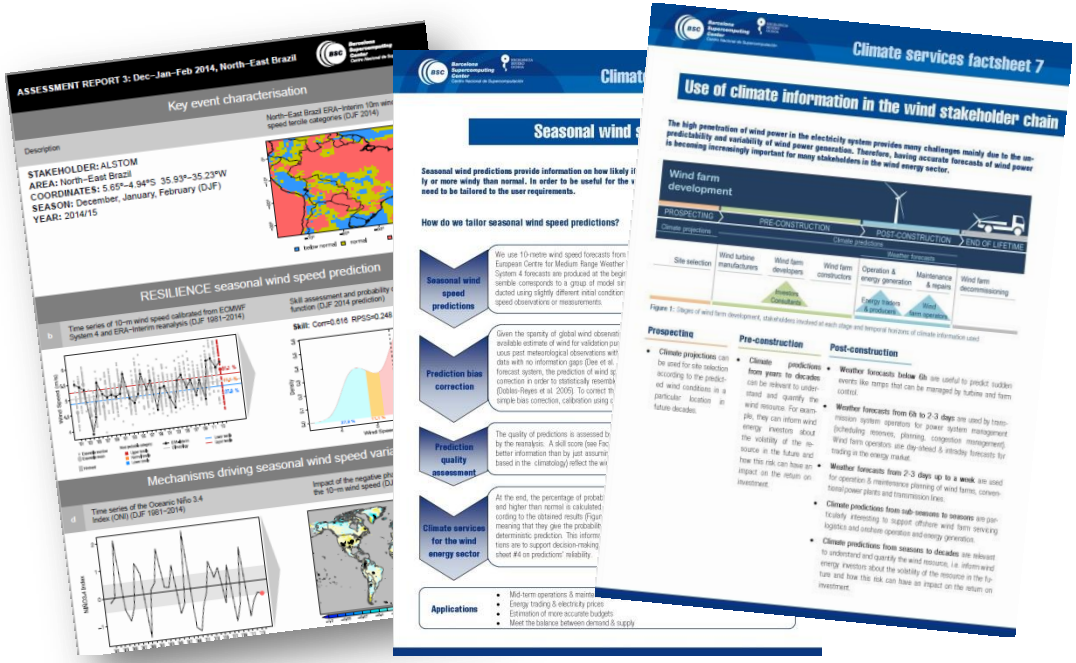
PROVIDERS **USERS**

Participatory approaches for user engagement (workshops, focus groups, interviews, surveys…)



From providers to users

Understandable information (factsheets, newsletters, key events, etc.)

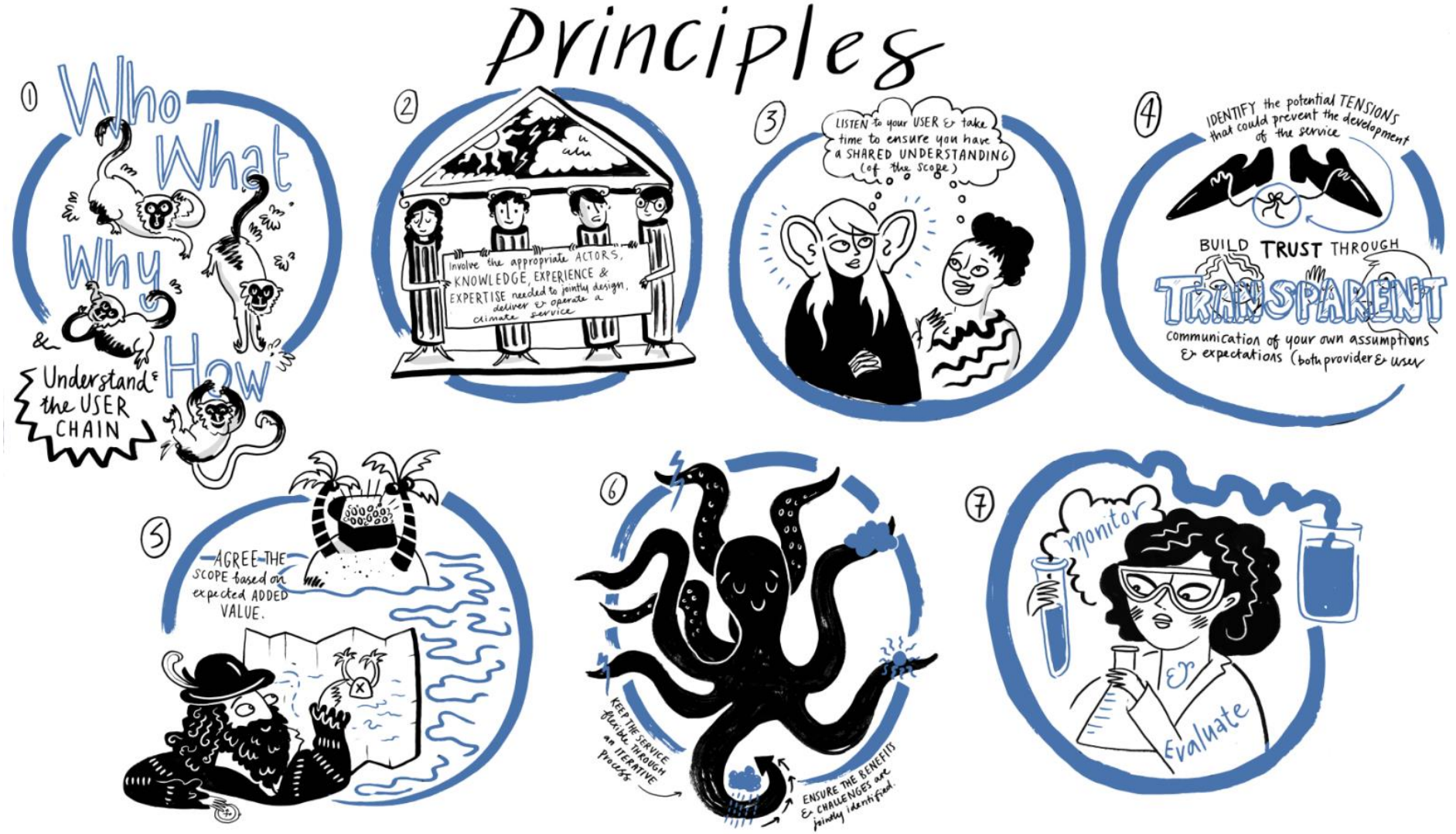


The Weather Roulette application - Innovative tools for reaching the users
Download app: https://play.google.com/store/apps/details?id=es.predictia.weatherroulette&hl=es

PROVIDERS → **USERS**

- Information of existing services and products. Potential for new products
- Communicate how to interpret products and uncertainties
- Added value

Challenges of service development



EUPORIAS

Scriberia MET OFFICE 17-19/11/2014 ECOMS symposium

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SUCCESS STORIES –
climate & air quality services

Success story – climate service

RESILIENCE Prototype:

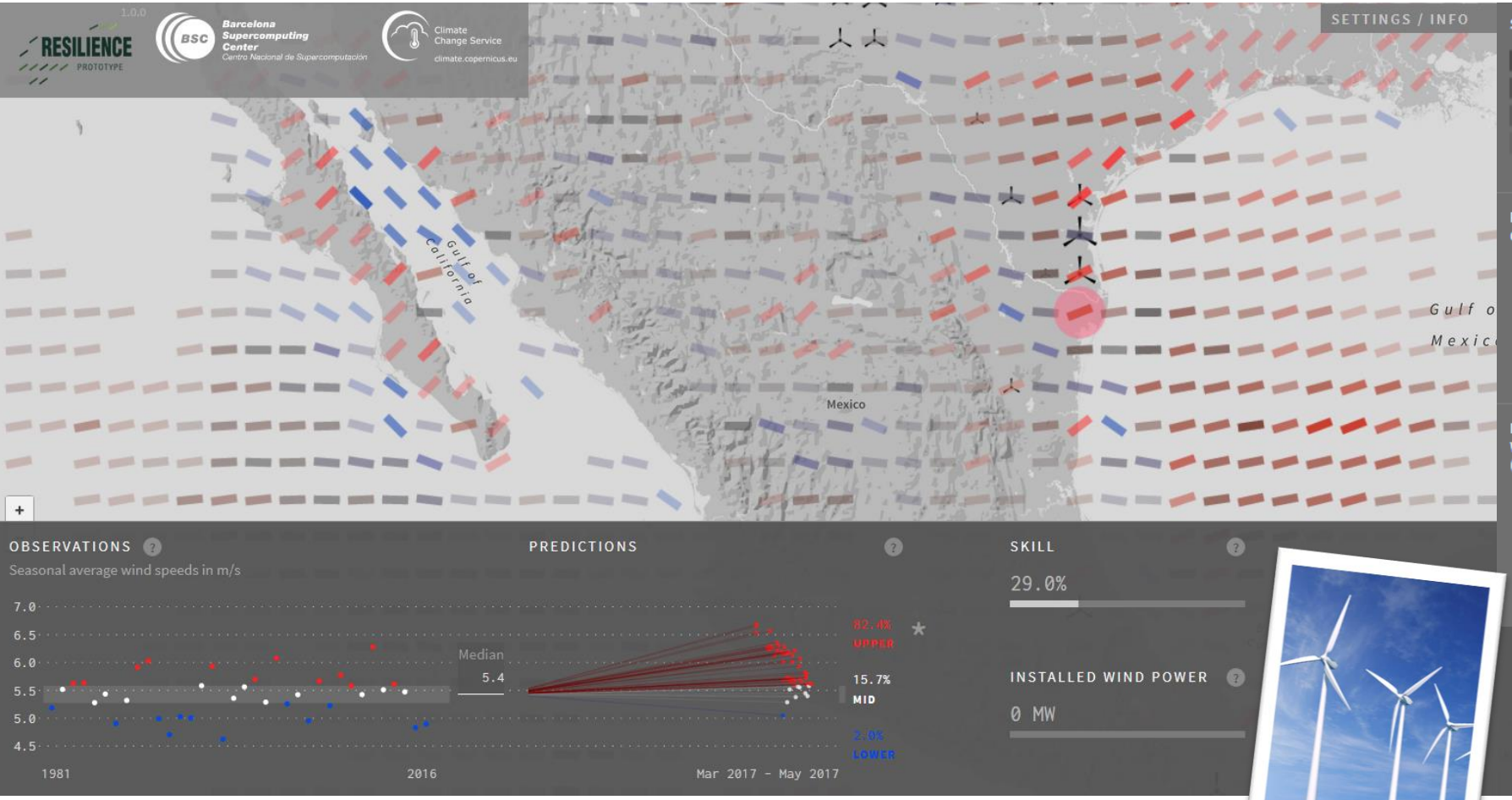
On-line visualisation tool for the wind energy sector

- Robust information on the future variability of wind worldwide (seasonal wind speed predictions)
- Joint development between scientists, a visualisation team and users from the renewable energy sector
- Effort in communicating probabilistic predictions to decision-makers

http://www.bsc.es/ess/resilience

Success story – climate service

Climate service for wind energy – The RESILIENCE prototype



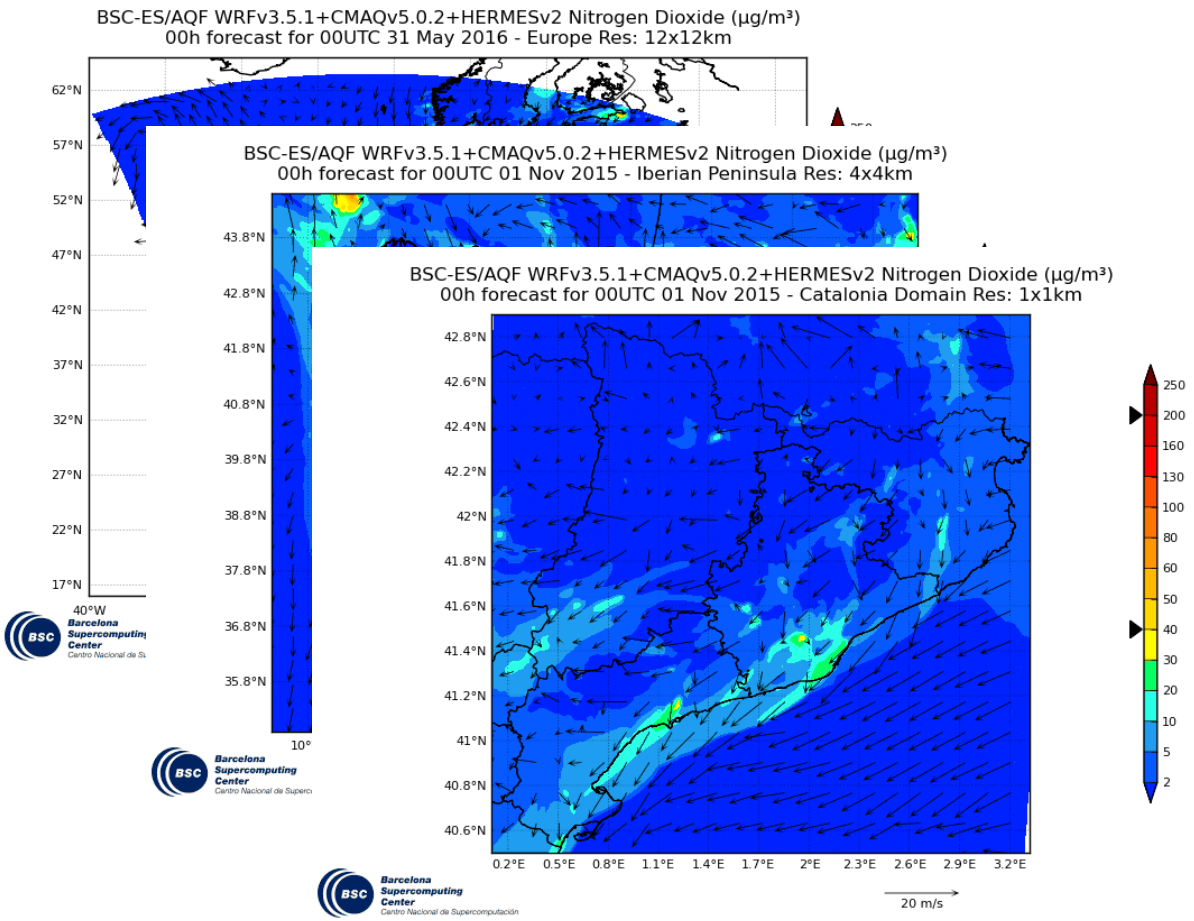
Applications

- Energy generation and trading
- Energy distribution
- Operations and maintenance planning

http://www.bsc.es/ess/resilience

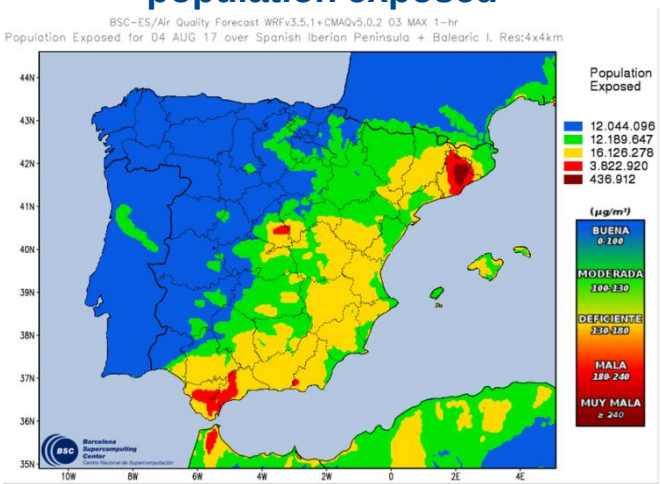
Success story – air quality service

CALIOPE air quality forecast system



- Web & smartphone app for air quality forecasts
- Operational air quality forecasts for the next 24/48h for major regulated pollutants in Europe (NO_2, SO_2, O_3, CO, PM_{10}, $PM_{2.5}$)

Air quality index and population exposed



http://www.bsc.es/caliope/

Success story – air quality service

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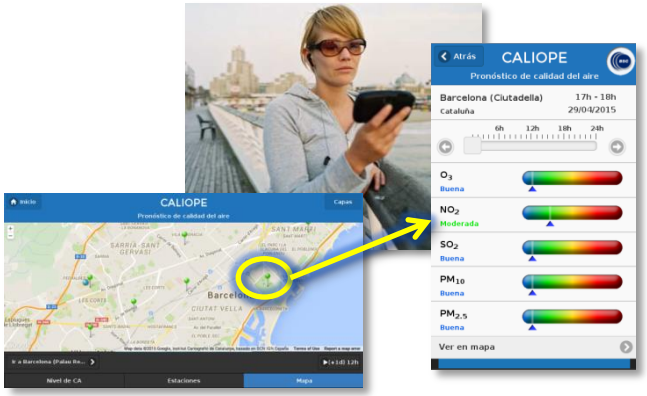
Applications



Health:
Anyone interested in the state of air quality (people with cardio-respiratory diseases, small children, runners…)

Urban planning:
Effect of management strategies to reduce atmospheric pollution and effects on citizens and the environment

Heavy industry:
Integrated assessment and control of point pollution sources (power, incineration or biomass plants, cement industries, etc.)

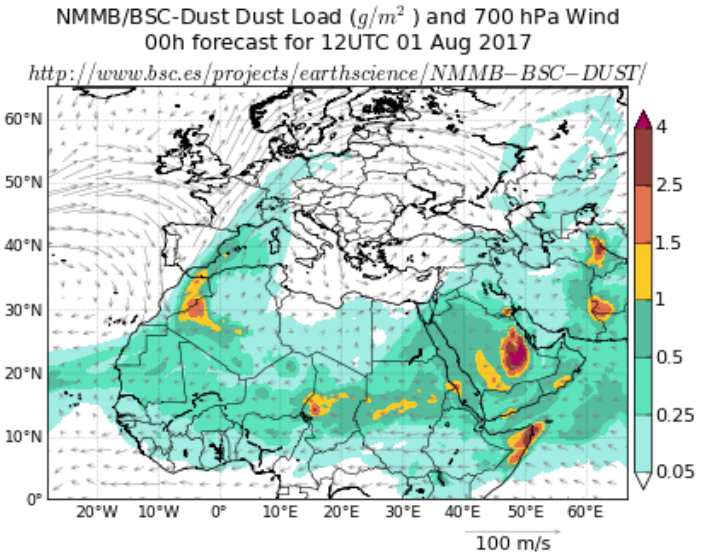
Success story – dust service

BSC dust daily forecast

• Operational dust daily forecast at 72 hours (daily updated)

www.bsc.es/ess/bsc-dust-daily-forecast

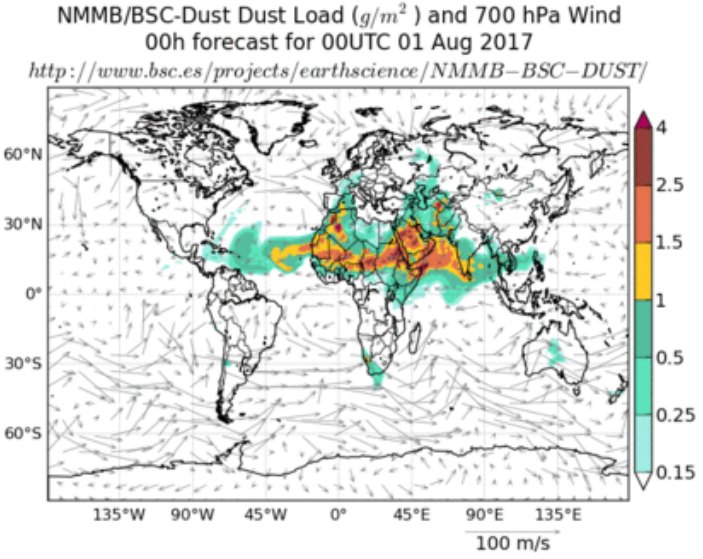
• Various variables (dust optical depth, dust surface concentration, dust dry and wet deposition…)



WMO Dust Centers

✓ **Sand and Dust Storm Warning Advisory and Assessment System Regional Center for North Africa, Middle East and Europe** (SDS-WAS RC) http://sds-was.aemet.es

✓ **Barcelona Dust Forecast Center** (BSFC): First specialized WMO Center for mineral dust prediction http://dust.aemet.es



Success story – dust service

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Applications

Solar energy:
Power forecasting, mid-term maintenance planning

Health:
Early-warning system for people with respiratory disorders

Agriculture:
Crop damage

Transportation:
Visibility assessments for airlines and flight managements (air)
Transportation impacts (ground)

Conclusions

- **Step 1:** Identify **user needs** through participatory approaches involving interdisciplinary groups that will guide research

- **Step 2: Co-development** of services ensuring that the research is user-driven

- **Step 3:** Include various iterations with users to incorporate **user's feedback** and ensure that the final services are understandable, useful and usable. This allows making services operational and therefore **sustainable in the long range**

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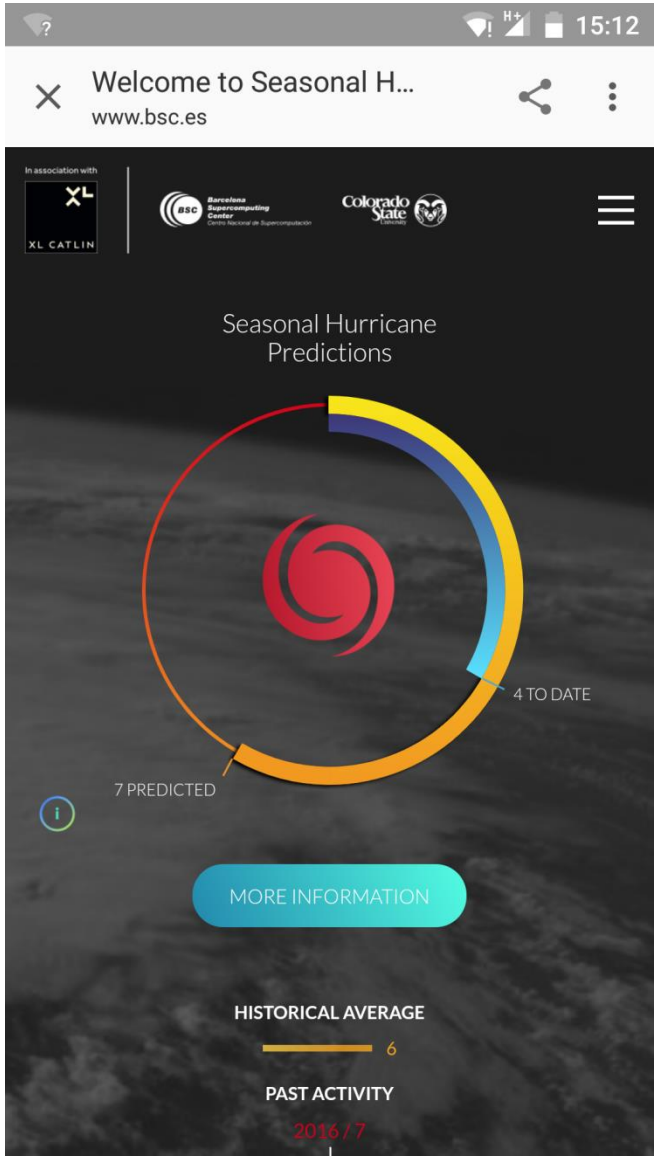
Thank you!

For further information please contact
marta.terrado@bsc.es

RESILIENCE **CLIM4ENERGY** **WMO SDS-WAS**

The research leading to these results has received funding from the Ministerio de Economía y Competitividad (MINECO) under project CGL2013-41055-R, the Catalan Government and the European Commission under a RIS3CAT project and a contract for the Copernicus Climate Change Service implemented by ECMWF on behalf of the European Commission

3- Climate service for insurance

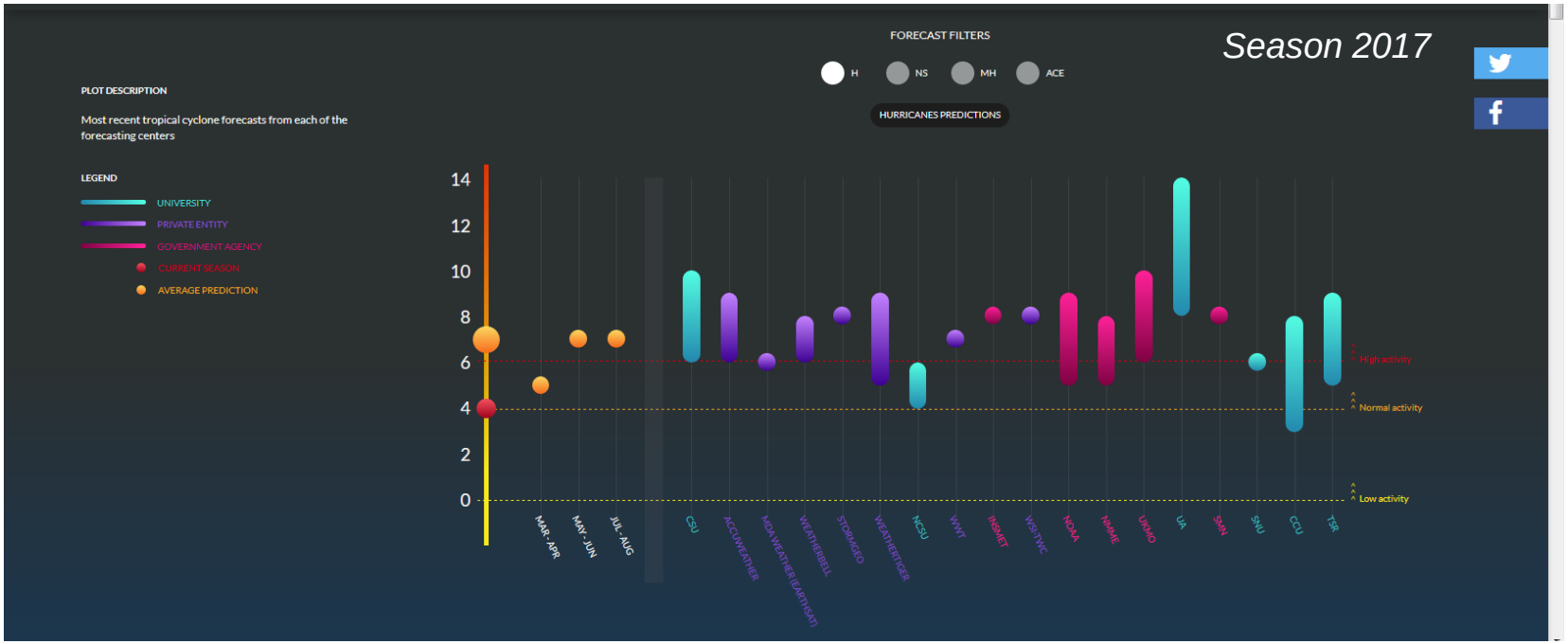


On-line visualisation platform of the seasonal hurricane activity for the re/insurance sector

- **Brings together** predictions from different centers that specialize in Atlantic hurricane forecasting
- Developed by a team of scientists, graphic designers and visualisation specialists **together with the user**
- Specific section for the scientific community & **informative section** for the general public

www.seasonalhurricanepredictions.org

3- Climate service for insurance



Medium-range climate predictions are **useful for the adaptation of the re/insurance sector to climate change.** Applications:

- Catastrophe evaluation
- Loss estimation / Price determination
- Preparation of the claim team and client warning